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# Costs and Structure of U.S. Hog Production, 1988-91

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**Costs and Structure of U.S. Hog Production, 1988-91.** By Hosein Shapouri, Kenneth H. Mathews, Jr., and Pat Bailey. Commodity Economics Division, Economic Research Service, U.S. Department of Agriculture. Agriculture Information Bulletin No. 692.

### **Abstract**

Hog producers' receipts and costs from 1988 through 1991 showed that net returns peaked in 1990. Hog and pig prices were higher than in 1988-89 with lower feed prices, which also increased returns for feeder pig producing and feeder pig finishing operations in 1990. The decline in net returns in 1991 was caused by lower prices in that year for slaughter hogs, feeder pigs, and cull hogs. Improved technologies led to more efficient production. Feed use declined 14 percent, or 60 pounds, per hundredweight of hogs and pigs sold from 1980 to 1988, with the North Central States showing the lowest feed expenses. Litter size continued an upward trend. Operations have on average become larger, with the large firms weaning more pigs per litter earlier at smaller weights and marketing hogs at slightly lower weights, although such large firms have relatively higher expenses for veterinary costs and labor. In all, the large operations were not much more profitable than the small ones, with the increased profits coming mostly from increased volume.

**Keywords:** Farrow-to-finish, feeder pig producer, feeder pig finisher, cost of production.

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## Summary

Hog producers' gains and costs from 1988 through 1991 show profits peaked in 1990. Returns to hog producers were positive in 1990-91, but rose most in 1990. Net returns in 1990 increased for feeder pig producing and feeder pig finishing operations because hog and pig prices were higher in 1990 and feed prices were lower. When prices for slaughter hogs, feeder pigs, and cull hogs dropped in 1991, profits declined. This report summarizes USDA data to trace methods, technologies, sizes, numbers, costs, and returns in various branches of the U.S. hog production industry.

Improved technologies led to more efficient hog production. The hog production industry changed significantly in the 1980's, becoming more specialized as industrialization and capital were substituted for labor. Feed use declined by 14 percent, or 60 pounds, per hundredweight, of hogs and pigs sold from 1980 to 1988, with the North Central States showing the lowest feed expenses. However, protein, feed supplements, and byproducts increased as farms increased in size. Larger litters, which have been the trend since at least 1973, also added to the positive residual returns to management and risk for larger farrow-to-finish operations during 1988-91. However, these residual returns were negative in 1988-90 for operations with 300 head and, in 1989, for operations with 650 head.

Larger operations showed different cost patterns. Operations have become larger, with successively larger shares of production being produced by fewer operations. The larger production operations showed cost and return advantages in litter size, feed expenses, and fixed cash costs. The large operations weaned more pigs per litter and weaned pigs earlier at smaller weights. These larger operations also sold market hogs at slightly lower weights. However, some costs, especially veterinary and hired labor expenses, increased dramatically as size of enterprise increased. Average purchased feed expenses were greatest for the largest operations, suggesting that, as the size of operation increased, a smaller share of feed was grown onfarm. Feed expenses and fixed cash costs declined as size of farrow-to-finish operation increased to 1,300 head but then increased somewhat with an even larger size of operation.

Nevertheless, the largest firms were not much more profitable than the small ones on the basis of per hundredweight of hogs sold. The increased profits of large firms appear to come mostly from increased volume, which justifies the present trend of increasing size in hog operations.

# Costs and Structure of U.S. Hog Production, 1988-91

Hosein Shapouri, Kenneth H. Mathews, Jr.,  
and Pat Bailey

## Introduction

The hog industry continues to play an important role in the U.S. agricultural sector, contributing more than a fourth of the red meat and poultry supply and just under 17 percent of red meat and poultry cash receipts in 1992. Hogs are produced in every State, but over 80 percent are concentrated in the North Central region, which is composed of the Corn Belt, Lake States, and Northern Plains (U.S. Department of Commerce, 1987).<sup>1</sup> These States also produced 89 and 82 percent of the Nation's corn and soybeans, two major inputs into hog production. The Southeast accounted for 12 percent of U.S. hog production in 1987.

The structure of the hog production industry changed significantly during the 1980's, becoming more specialized as industrialization and large commitments of capital have been substituted for labor in all stages of production. Operations have become larger, with successively larger shares of production being produced by fewer operations (fig. 1). In 1964, only half a percent of hog producers were selling 1,000 head or more. In 1987, the 10 percent of hog producers with sales of 1,000 head or more accounted for 58 percent of all sales.

Improved production technologies have led to more efficient hog production. Variable costs were below \$40 for over 85 percent of producers (fig. 2). The average amount of feed fed declined 60 pounds per hundredweight (cwt) of hogs and pigs sold from 1980 to 1988. The number of pigs per litter, a significant factor affecting pork production costs, also increased by one pig per litter between 1973 (7.1 pigs) and 1992 (8.1 pigs) (Hogs and Pigs). Specialized feeder pig production operations saved more pigs per litter than did farrow-to-finish

operations in 1988. The number of pigs per litter varied by size and region in 1988. Small farrow-to-finish operations (300 head) had less than 8 pigs per litter, and large operations had more than 9 pigs per litter. Farms in the North Central region had slightly more pigs per litter than farms in the Southeast. Feeder pig producers and large farrow-to-finish operators also weaned somewhat younger pigs on average than other farrow-to-finish producers. Small farrow-to-finish producers weaned the oldest pigs, on average.

## Data

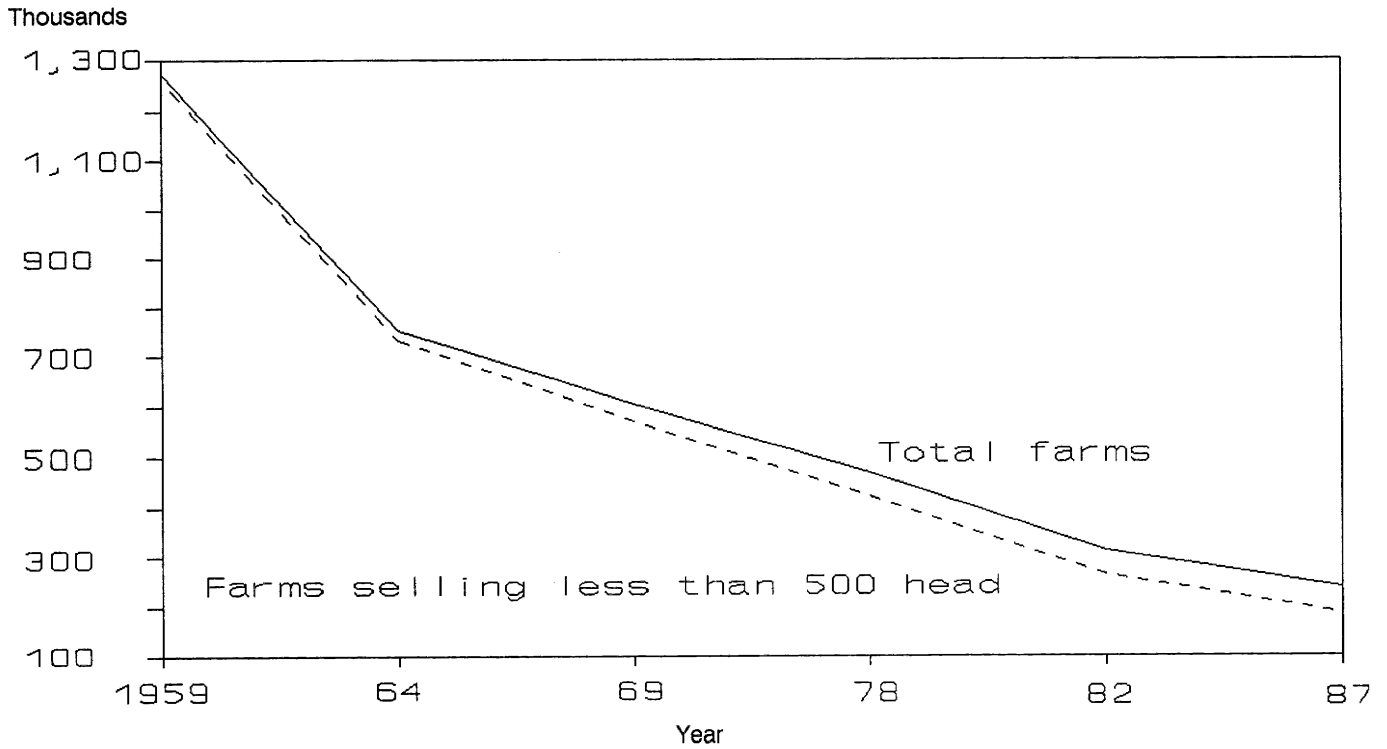
Estimates in this report are based on responses to the hog cost of production (COP) version of the 1988 Farm Costs and Returns Survey (FCRS). FCRS data, obtained from 871 hog operations surveyed in February and March 1989, other National Agricultural Statistics Service (NASS) data, and data from other published sources were combined for these estimates. This information was used to establish a 1988 national hog production cost base from which to update production costs in the years between the 1988 survey and the next survey.

The estimates do not represent a specific producer, nor are they economically engineered to be a "typical" hog operation, nor do they represent "best management" practices. Instead, the data reflect the 1988 average costs and returns of a sample of hog producers from 18 States drawn to represent the United States, 6 size groups, and 2 regions. An individual farm may have different production costs and returns due to varying input and output mixes and types of operations.

Several changes were made in the estimation procedures for hog production cost since the last hog cost of production (COP) survey in 1980 (app. fig. 1). Additional information on methodology, procedures, terms, and definitions is included in the appendix.

<sup>1</sup>Items in parentheses are cited in the References section at the end of this report.

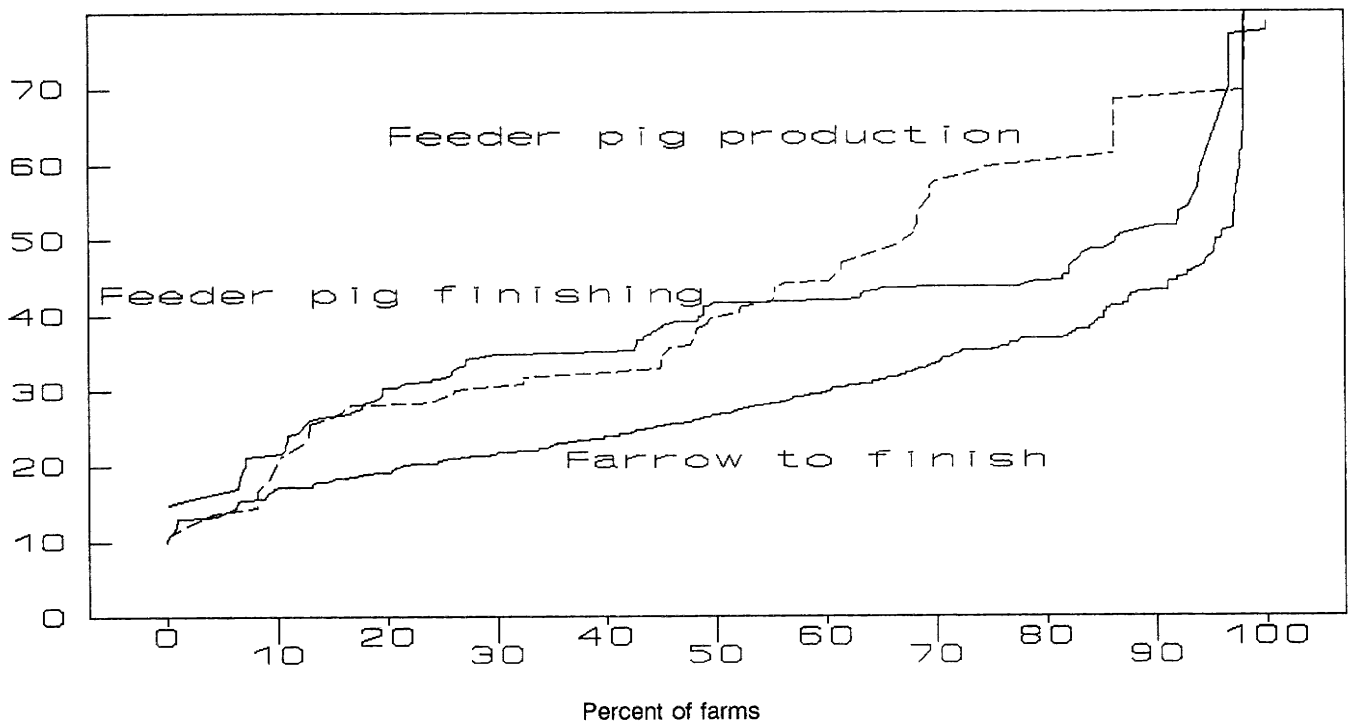
Figure 1  
**Number of U.S. hog farms, 1959-87**



Source: U.S. Census of Agriculture

Figure 2  
**Share of farms with costs per hundredweight of hogs sold, 1988**

\$ per cwt  
of hogs sold



## **Farrow-to-Finish Hog Production**

Farrow-to-finish hog operations show differences in average size, costs, and net returns for the Nation as a whole and the various regions.

### **United States as a Whole**

Net cash returns to farrow-to-finish operations peaked in 1990, then declined in 1991. Feed costs per cwt of hogs sold increased slightly in 1989 due to the widespread drought of 1988, then declined 7.5 percent in 1990 and 2.3 percent in 1991 (table 1). Lower feed costs and interest expenses offset higher expenses of other inputs. Total cash receipts to farrow-to-finish operations were high enough to cover cash expenses plus replacement and total economic costs during 1988-91. The per cwt residual returns to management and risk for all farrow-to-finish producers were \$13.99 in 1990 and \$8.18 in 1991. Larger operations did better than small operations during the 4-year period of 1988-91 (tables 2-7). Residual returns to management and risk for larger operations were positive throughout 1988-91 but were negative for operations with 300 head (1988, 1989, and 1991) and for operations with 650 head (1989).

Farrow-to-finish operations exhibited some interesting relationships between size and costs of production in surveyed farms. Feed expenses and fixed cash costs declined as size of the farrow-to-finish operation increased to 1,300 head, then increased somewhat with size of operation. This pattern suggested economies of size from the smallest sized operations to about 1,300-head operations, then diseconomies of size for increasingly larger operations, or that there might be an optimum-sized operation per cwt of pigs sold with respect to both feed costs and fixed cash costs.

The feed expense diseconomies of size were not expected because larger operations tend to have their own feed mills (table 8) and are able to purchase feed at volume discounts. Insufficient data were collected to allow differentiation between purchased and homegrown feed on the 1988 hog version of the FCRS. Further, all feed was priced at a weighted average of published NASS prices, and continuing economies of size beyond 1,300-head operations may not have been captured. Also, a contributing factor may have been that both protein and nonprotein byproducts were combined on the survey questionnaire and priced as a single byproduct.

However, several expected patterns did emerge. Pounds of feed grains fed per cwt of hogs and pigs sold decreased while pounds of protein, supplements, and byproducts fed increased as operations increased in size (table 9). The relatively larger amounts of protein, supplements, and byproducts fed by larger operations may have been required because larger operations weaned pigs earlier and at smaller weights (table 10), and younger pigs needed more protein. Further, we know that average purchased feed expenses were greatest for the largest operations, suggesting that as the size of operation increased, a smaller share of the feed was grown onfarm. Declining shares of homegrown feed with increasing hog numbers occur because larger corn acreages would be required to provide for all hog feed requirements for larger operations. Other variable costs increased as size of operation increased. For example, both veterinary and hired labor expenses increased significantly as size of operation increased.

Larger operations that weaned pigs earlier and at smaller weights also weaned more pigs per litter (table 10). In addition, the larger operations also sold market hogs at slightly lower weights. The combination of more pigs weaned and sold at lighter weights suggests that large operators may have longer planning horizons than smaller operators, since it is generally more profitable to produce more sets of hogs in, say, 10 years than it is to maximize profits for a single set. The larger operations are able to hire specialized labor, which improves efficiency in areas like farrowing, marketing, and feed nutrition.

Fixed costs also followed an unexpected pattern similar to the feed patterns across size groups. The general farm overhead component of fixed costs increased most as size of operation increased. A tradeoff probably existed between general farm overhead and capital replacement expenditures; for example, as machinery and equipment costs decline with increasing size of operation, utility expenses or other expenses might cost more. Capital replacement decreased as size of operation increased, spreading building, machinery, and equipment costs over more hogs produced. The 1,000-head operations appear to have had the greatest net cash return per cwt of hogs sold, though probably not the largest return per farm.

Residual returns to management and risk improved for all sizes of operations from 1988 to 1990 but declined in 1991 because of lower prices for market hogs in 1991. Residual returns for 300-head



Table 1--U.S. farrow-to-finish production cash costs and returns, all sizes of operations, 1988-91

Item	1988	1989	1990	1991
<i>Dollars per cwt of hogs and pigs sold</i>				
Cash receipts:				
Slaughter hogs (90.26 lbs)	39.22	39.79	49.18	44.14
Feeder pigs (1.39 lbs)	1.17	1.10	1.68	1.51
Cull sows (8.35 lbs)	3.06	3.33	4.41	3.78
Total	43.45	44.22	55.27	49.43
=====				
Cash expenses:				
Feeders--				
Feeder pigs	0.16	0.15	0.24	0.21
Feed--				
Grain	12.96	13.82	13.62	13.29
Protein, byproducts, and other supplements	9.85	9.78	8.21	8.03
Total feed costs	22.81	23.60	21.83	21.33
Other--				
Veterinary and medicine	0.83	0.90	0.93	1.01
Livestock hauling	0.12	0.12	0.13	0.13
Marketing	0.38	0.40	0.41	0.42
Fuel and lube	0.78	0.86	0.98	0.96
Machinery and building repairs	1.35	1.41	1.50	1.46
Hired labor (0.36 hrs)	1.84	1.97	2.03	2.21
Manure handling	0.01	0.01	0.01	0.01
Miscellaneous	0.16	0.17	0.17	0.19
Total, variable cash expenses	28.44	29.59	28.26	27.92
General farm overhead	2.19	2.28	2.34	2.38
Taxes and insurance	0.68	0.67	0.67	0.66
Interest	2.15	2.05	2.02	1.97
Total, fixed cash expenses	5.02	5.00	5.03	5.01
Total, cash expenses	33.46	34.59	33.28	32.93
Cash receipts less cash expenses	9.99	9.62	21.99	16.50
Capital replacement	3.60	3.74	3.99	4.12
Total, cash expenses and capital expenses	37.06	38.33	37.28	37.05
Net cash returns	6.39	5.88	18.00	12.38
=====				
Economic (full ownership) costs:				
Variable cash expenses	28.44	29.59	28.26	27.92
General farm overhead	2.19	2.28	2.34	2.38
Taxes and insurance	0.68	0.67	0.67	0.66
Capital expenditures	3.60	3.74	3.99	4.12
Operating capital	0.49	0.59	0.53	0.38
Other nonland capital	1.06	1.18	1.32	1.47
Land	0.07	0.07	0.08	0.09
Unpaid labor (0.76 hrs)	3.86	3.96	4.09	4.22
Total, economic costs	40.39	42.08	41.28	41.25
Residual returns to management and risk	3.06	2.13	13.99	8.18

Source: Hog version, 1988 FCRS data.

Table 2--U.S. farrow-to-finish production cash costs and returns, 300-head operations, 1988-91

Item	1988	1989	1990	1991
<i>Dollars per cwt of hogs and pigs sold</i>				
Cash receipts:				
Slaughter hogs (90.75 lbs)	40.03	40.61	50.15	44.97
Feeder pigs (1.09 lbs)	0.88	0.82	1.26	1.10
Cull sows (8.15 lbs)	2.72	2.98	4.01	3.45
Total	43.63	44.42	55.42	49.53
=====				
Cash expenses:				
Feeders--				
Feeder pigs	0.12	0.12	0.19	0.15
Feed--				
Grain	15.44	16.59	16.32	16.00
Protein, byproducts, and other supplements	10.19	10.15	8.57	8.27
Total feed costs	25.63	26.74	24.90	24.27
Other--				
Veterinary and medicine	0.61	0.64	0.68	0.72
Livestock hauling	0.14	0.15	0.17	0.17
Marketing	0.38	0.40	0.41	0.42
Fuel and lube	1.11	1.23	1.38	1.37
Machinery and building repairs	1.76	1.83	1.97	1.90
Hired labor (0.20 hrs)	1.02	1.11	1.14	1.21
Manure handling	0.01	0.01	0.01	0.01
Miscellaneous	0.28	0.32	0.30	0.39
Total, variable cash expenses	31.06	32.54	31.15	30.60
General farm overhead	2.70	2.85	2.93	3.00
Taxes and insurance	1.38	1.39	1.40	1.40
Interest	3.23	3.12	3.01	2.93
Total, fixed cash expenses	7.31	7.37	7.35	7.33
Total, cash expenses	38.37	39.90	38.50	37.93
Cash receipts less cash expenses	5.26	4.52	16.92	11.60
Capital replacement	3.43	3.55	3.82	3.90
Total, cash expenses and capital expenses	41.80	43.46	42.32	41.84
Net cash returns	1.83	0.96	13.10	7.69
=====				
Economic (full ownership) costs:				
Variable cash expenses	31.06	32.54	31.15	30.60
General farm overhead	2.70	2.85	2.93	3.00
Taxes and insurance	1.38	1.39	1.40	1.40
Capital expenditures	3.43	3.55	3.82	3.90
Operating capital	0.54	0.65	0.58	0.42
Other nonland capital	1.41	1.58	1.79	2.00
Land	0.27	0.32	0.36	0.43
Unpaid labor (2.22 hrs)	11.33	12.10	12.58	13.32
Total, economic costs	52.12	54.99	54.62	55.07
Residual returns to management and risk	-8.49	-10.57	0.80	-5.54

Source: Hog version, 1988 FCRS data.

Table 3--U.S. farrow-to-finish production cash costs and returns, 650-head operations, 1988-91

Item	1988	1989	1990	1991
<i>Dollars per cwt of hogs and pigs sold</i>				
Cash receipts:				
Slaughter hogs (90.06 lbs)	38.86	39.41	48.83	43.77
Feeder pigs (0.76 lbs)	0.56	0.52	0.79	0.67
Cull sows (9.18 lbs)	3.39	3.72	4.83	4.25
Total	42.81	43.66	54.45	48.69
=====				
Cash expenses:				
Feeders--				
Feeder pigs	0.32	0.28	0.44	0.42
Feed--				
Grain	13.83	14.83	14.65	14.18
Protein, byproducts, and other supplements	8.75	8.74	7.32	7.17
Total feed costs	22.58	23.57	21.98	21.34
Other--				
Veterinary and medicine	0.68	0.73	0.75	0.77
Livestock hauling	0.11	0.11	0.11	0.11
Marketing	0.38	0.40	0.41	0.42
Fuel and lube	0.86	0.95	1.06	1.05
Machinery and building repairs	1.31	1.39	1.47	1.44
Hired labor (0.17 hrs)	0.83	0.88	0.91	0.96
Manure handling	0.00	0.00	0.00	0.00
Miscellaneous	0.15	0.16	0.15	0.15
Total, variable cash expenses	27.22	28.47	27.29	26.66
General farm overhead	1.94	2.04	2.10	2.14
Taxes and insurance	0.62	0.63	0.64	0.63
Interest	1.99	1.91	1.90	1.90
Total, fixed cash expenses	4.55	4.59	4.64	4.67
Total, cash expenses	31.77	33.05	31.93	31.32
Cash receipts less cash expenses	11.04	10.61	22.51	17.36
Capital expenditures	4.42	4.69	5.06	5.03
Total, cash expenses and capital expenses	36.19	37.75	36.99	36.35
Net cash returns	6.62	5.91	17.46	12.34
=====				
Economic (full ownership) costs:				
Variable cash expenses	27.22	28.47	27.29	26.66
General farm overhead	1.94	2.04	2.10	2.14
Taxes and insurance	0.62	0.63	0.64	0.63
Capital expenditures	4.42	4.69	5.06	5.03
Operating capital	0.47	0.58	0.52	0.37
Other nonland capital	1.07	1.21	1.36	1.51
Land	0.08	0.09	0.11	0.12
Unpaid labor (1.13 hrs)	5.71	6.10	6.40	6.74
Total, economic costs	41.53	43.82	43.48	43.20
Residual returns to management and risk	1.28	-0.16	10.97	5.49

Source: Hog version, 1988 FCRS data.

Table 4--U.S. farrow-to-finish production cash costs and returns, 1,300-head operations, 1988-91

Item	1988	1989	1990	1991
<i>Dollars per cwt of hogs and pigs sold</i>				
Cash receipts:				
Slaughter hogs (89.68 lbs)	39.13	39.72	49.15	44.01
Feeder pigs (1.03 lbs)	0.86	0.78	1.15	1.22
Cull sows (9.29 lbs)	3.12	3.41	4.47	3.84
Total	43.11	43.90	54.77	49.07
=====				
Cash expenses:				
Feeders--				
Feeder pigs	0.23	0.21	0.33	0.29
Feed--				
Grain	12.18	13.01	12.84	12.64
Protein, byproducts, and other supplements	9.09	9.00	7.56	7.49
Total feed costs	21.27	22.00	20.39	20.13
Other--				
Veterinary and medicine	0.73	0.79	0.81	0.89
Livestock hauling	0.06	0.05	0.07	0.06
Marketing	0.38	0.40	0.41	0.42
Fuel and lube	0.78	0.85	0.96	0.97
Machinery and building repairs	1.35	1.42	1.53	1.51
Hired labor (0.28 hrs)	1.43	1.52	1.57	1.70
Manure handling	0.01	0.01	0.01	0.01
Miscellaneous	0.14	0.15	0.15	0.15
Total, variable cash expenses	26.38	27.40	26.24	26.12
General farm overhead	1.77	1.85	1.91	1.96
Taxes and insurance	0.63	0.63	0.64	0.64
Interest	1.61	1.55	1.54	1.49
Total, fixed cash expenses	4.01	4.03	4.09	4.09
Total, cash expenses	30.39	31.43	30.33	30.22
Cash receipts less cash expenses	12.72	12.47	24.44	18.85
Capital expenditures	4.22	4.37	4.64	4.99
Total, cash expenses and capital expenses	34.61	35.81	34.96	35.21
Net cash returns	8.50	8.10	19.81	13.86
=====				
Economic (full ownership) costs:				
Variable cash expenses	26.38	27.40	26.24	26.12
General farm overhead	1.77	1.85	1.91	1.96
Taxes and insurance	0.63	0.63	0.64	0.64
Capital expenditures	4.22	4.37	4.64	4.99
Operating capital	0.46	0.55	0.49	0.35
Other nonland capital	1.07	1.19	1.35	1.51
Land	0.04	0.05	0.05	0.08
Unpaid labor (0.60 hrs)	3.07	3.25	3.34	3.60
Total, economic costs	37.64	39.29	38.66	39.26
Residual returns to management and risk	5.47	4.61	16.12	9.81

Source: Hog version, 1988 FCRS data.

Table 5--U.S. farrow-to-finish production cash costs and returns, 3,000-head operations, 1988-91

Item	1988	1989	1990	1991
<i>Dollars per cwt of hogs and pigs sold</i>				
Cash receipts:				
Slaughter hogs (90.24 lbs)	38.93	39.49	48.77	43.83
Feeder pigs (2.08 lbs)	1.82	1.71	2.68	2.27
Cull sows (7.43 lbs)	3.04	3.27	4.36	3.73
Total	43.79	44.47	55.80	49.83
=====				
Cash expenses:				
Feeders--				
Feeder pigs	0.09	0.08	0.13	0.11
Feed--				
Grain	12.40	13.26	13.10	12.80
Protein, byproducts, and other supplements	10.16	10.05	8.47	8.27
Total feed costs	22.56	23.31	21.56	21.07
Other--				
Veterinary and medicine	0.99	1.06	1.10	1.17
Livestock hauling	0.13	0.12	0.13	0.13
Marketing	0.38	0.40	0.41	0.42
Fuel and lube	0.77	0.85	0.96	0.96
Machinery and building repairs	1.35	1.40	1.50	1.46
Hired labor (0.36 hrs)	1.82	1.92	1.97	2.13
Manure handling	0.01	0.01	0.01	0.01
Miscellaneous	0.15	0.16	0.16	0.15
Total, variable cash expenses	28.25	29.31	27.95	27.62
General farm overhead	2.15	2.24	2.32	2.35
Taxes and insurance	0.60	0.60	0.61	0.61
Interest	2.44	2.35	2.31	2.30
Total, fixed cash expenses	5.19	5.19	5.24	5.25
Total, cash expenses	33.44	34.50	33.19	32.87
Cash receipts less cash expenses	10.35	9.97	22.61	16.96
Capital expenditures	2.99	3.06	3.26	3.35
Total, cash expenses and capital expenses	36.43	37.56	36.45	36.22
Net cash returns	7.36	6.92	19.35	13.61
=====				
Economic (full ownership) costs:				
Variable cash expenses	28.25	29.31	27.95	27.62
General farm overhead	2.15	2.24	2.32	2.35
Taxes and insurance	0.60	0.60	0.61	0.61
Capital expenditures	2.99	3.06	3.26	3.35
Operating capital	0.49	0.59	0.52	0.38
Other nonland capital	0.97	1.09	1.22	1.37
Land	0.22	0.02	0.03	0.03
Unpaid labor (0.47 hrs)	2.38	2.54	2.64	2.79
Total, economic costs	38.05	39.46	38.55	38.49
Residual returns to management and risk	5.74	5.02	17.26	11.34

Source: Hog version, 1988 FCRS data.

Table 6--U.S. farrow-to-finish production cash costs and returns, 10,000-head operations, 1988-91

Item	1988	1989	1990	1991
<i>Dollars per cwt of hogs and pigs sold</i>				
Cash receipts:				
Slaughter hogs (90.50 lbs)	39.49	40.09	49.54	44.45
Feeder pigs (1.31 lbs)	1.08	1.00	1.56	1.39
Cull sows (8.19 lbs)	3.22	3.49	4.67	4.04
Total	43.79	44.59	55.78	49.88
=====				
Cash expenses:				
Feeders--				
Feeder pigs	0.13	0.13	0.17	0.22
Feed--				
Grain	12.31	13.18	12.99	12.64
Protein, byproducts, and other supplements	11.20	11.18	9.32	9.12
Total feed costs	23.51	24.35	22.31	21.75
Other--				
Veterinary and medicine	0.95	1.02	1.06	1.16
Livestock hauling	0.15	0.16	0.17	0.17
Marketing	0.38	0.40	0.41	0.42
Fuel and lube	0.61	0.66	0.75	0.75
Machinery and building repairs	1.11	1.16	1.22	1.18
Hired labor (0.61 hrs)	3.15	3.39	3.46	3.72
Manure handling	0.07	0.07	0.08	0.07
Miscellaneous	0.22	0.23	0.23	0.23
Total, variable cash expenses	30.28	31.57	29.87	29.67
General farm overhead	2.12	2.22	2.29	2.30
Taxes and insurance	0.40	0.40	0.41	0.40
Interest	1.79	1.74	1.70	1.68
Total, fixed cash expenses	4.31	4.36	4.40	4.39
Total, cash expenses	34.59	35.93	34.26	34.06
Cash receipts less cash expenses	9.20	8.66	21.52	15.82
Capital expenditures	3.24	3.35	3.54	3.60
Total, cash expenses and capital expenses	37.83	39.27	37.80	37.65
Net cash returns	5.96	5.32	17.98	12.23
=====				
Economic (full ownership) costs:				
Variable cash expenses	30.28	31.57	29.87	29.67
General farm overhead	2.12	2.22	2.29	2.30
Taxes and insurance	0.40	0.40	0.41	0.40
Capital expenditures	3.24	3.35	3.54	3.60
Operating capital	0.52	0.63	0.56	0.40
Other nonland capital	0.90	1.01	1.13	1.26
Land	0.02	0.02	0.03	0.03
Unpaid labor (0.15 hrs)	0.80	0.85	0.89	0.94
Total, economic costs	38.28	40.05	38.71	38.60
Residual returns to management and risk	5.51	4.54	17.07	11.28

Source: Hog version, 1988 FCRS data.

Table 7--U.S. farrow-to-finish production cash costs and returns, 15,000-head operations, 1988-91

Item	1988	1989	1990	1991
<i>Dollars per cwt of hogs and pigs sold</i>				
Cash receipts:				
Slaughter hogs (90.71 lbs)	39.64	40.26	49.72	44.81
Feeder pigs (1.97 lbs)	1.71	1.55	2.47	2.05
Cull sows (7.32 lbs)	2.52	2.74	3.65	3.03
Total	43.87	44.54	55.84	49.89
=====				
Cash expenses:				
Feeders--				
Feeder pigs	0.03	0.02	0.03	0.02
Feed--				
Grain	12.73	13.68	13.37	13.27
Protein, byproducts, and other supplements	11.11	11.09	9.32	8.87
Total feed costs	23.84	24.77	22.70	22.14
Other--				
Veterinary and medicine	1.16	1.24	1.35	1.34
Livestock hauling	0.29	0.30	0.33	0.35
Marketing	0.38	0.40	0.41	0.42
Fuel and lube	0.44	0.47	0.55	0.52
Machinery and building repairs	1.14	1.19	1.27	1.22
Hired labor (0.98 hrs)	4.97	5.26	5.49	5.66
Manure handling	0.00	0.00	0.00	0.00
Miscellaneous	0.08	0.08	0.09	0.09
Total, variable cash expenses	32.33	33.73	32.21	31.76
General farm overhead	3.59	3.72	3.88	3.75
Taxes and insurance	0.50	0.50	0.50	0.48
Interest	2.02	1.92	1.92	1.79
Total, fixed cash expenses	6.11	6.15	6.30	6.02
Total, cash expenses	38.44	39.88	38.50	37.78
Cash receipts less cash expenses	5.43	4.66	17.33	12.11
Capital expenditures	2.84	2.91	3.12	3.21
Total, cash expenses and capital expenses	41.28	42.79	41.62	40.99
Net cash returns	2.59	1.75	14.21	8.90
=====				
Economic (full ownership) costs:				
Variable cash expenses	32.33	33.73	32.21	31.76
General farm overhead	3.59	3.72	3.88	3.75
Taxes and insurance	0.50	0.50	0.50	0.48
Capital expenditures	2.84	2.91	3.12	3.21
Operating capital	0.56	0.68	0.60	0.43
Other nonland capital	0.95	1.07	1.19	1.34
Land	0.01	0.01	0.01	0.02
Unpaid labor (0.07 hrs)	0.36	0.37	0.40	0.40
Total, economic costs	41.14	43.00	41.90	41.39
Residual returns to management and risk	2.73	1.55	13.93	8.50

Source: Hog version, 1988 FCRS data.

Table 8--Feed handling equipment and machinery used by hog operations by size and region, 1988

Type, size, or region	Grinder-mixer		Roller mill	Hammer mill	Self unloading wagon	Feed conveying system
	Portable	Stationary				
<i>Percent of farms reporting</i>						
Farrow-to-finish:						
300 head	69	3	83	0	6	11
650 head	80	9	87	1	17	33
1,000 head	68	18	97	8	15	54
3,000 head	60	35	90	6	23	53
10,000 head	33	43	93	12	29	70
15,000 head	10	49	93	37	27	66
United States	57	26	91	8	19	49
North Central	61	26	97	7	22	51
Southeast	49	26	78	11	14	45
Feeder pig production	38	9	70	8	11	30
Feeder pig finishing	46	18	79	5	5	48

Source: Hog version, 1988 FCRS data.

Table 9--Grain, protein and other feed fed per cwt of hogs and pigs sold, 1980 and 1988

Type, size, or region	1980			1988		
	Feed grains	Protein, by-products, and other supplements	Total feed	Feed grains	Protein, by-products, and other supplements	Total feed
<i>Pounds per cwt of hogs and pigs sold</i>						
Farrow-to-finish:						
300 head	354	80	434	427	75	502
650 head	353	81	434	300	72	372
1,000 head	346	85	431	260	64	323
3,000 head	348	80	428	272	83	355
10,000 head	337	78	415	251	103	354
15,000 head	NA	NA	NA	236	150	386
United States	348	81	429	288	82	370
North Central	349	84	430	289	76	365
Southeast	346	81	430	279	129	408
Feeder pig production	427	117	544	321	151	472
Feeder pig finishing	239	45	284	205	74	279

NA = Not available.

Source: Hog version, 1988 FCRS data.



Table 10--Pigs per litter, weaning age, weaning weights, marketing weights, and farm diversification, 1988

Type, size, or region	Pigs per litter	Weaning		Market weight	Diversification	
		Age	Weight		Cattle	Corn
	<i>Head</i>	<i>Weeks</i>	<i>Pounds per head</i>	<i>Pounds per head</i>	<i>Percent of farms reporting</i>	
Farrow-to-finish:						
300 head	7.6	6.1	31.5	236	65	76
650 head	8.4	5.5	27.6	238	57	83
1,000 head	8.3	4.7	23.4	237	50	84
3,000 head	8.6	4.2	19.5	235	47	73
10,000 head	9.1	3.9	17.4	232	41	64
15,000 head	9.4	3.8	15.4	225	17	46
United States	8.4	4.6	22.0	235	48	74
North Central	8.4	4.5	21.4	236	46	79
Southeast	8.6	4.8	23.3	227	54	61
Feeder pig production:	8.8	4.2	19.1	233	36	43
Feeder pig finishing:	7.1	4.0	18.0	237	51	76

Source: Hog version, 1988 FCRS data.

operations were negative in 1988, 1989, and 1991. Imputed expenses for unpaid family labor accounted for more than 20 percent of total economic costs in 1988. Family labor included operator's time spent in the hog enterprise and accounted for 90 percent of total labor. The 650-head hog operations had negative residual returns to management and risk per cwt of hogs sold in 1989.

### U.S. Regions

The North Central region accounted for more than 80 percent of U.S. hog production, had the lowest average costs, and had the highest average receipts (table 11). Cash receipts to hog producers in the North Central region were higher than in the Southeast and were high enough to cover total economic costs during 1988-91. Cash receipts in the Southeast were high enough to cover cash costs and capital expenditures during 1988-91 but not high enough to cover economic costs in 1988 and 1989 (table 12). In 1991, cash receipts in the Southeast decreased more than did total cash expenses and capital expenditures, and as a result, net cash receipts declined in 1991. Feed expenses in the North Central region were lower than in the Southeast by more than \$3.50 per cwt of hogs and pigs sold.

### Feeder Pig Production

Cash receipts to feeder pig producers increased almost 50 percent from 1989 to 1990 because of higher prices of market hogs and feeder pigs (table 13). Revenue from the sale of feeder pigs accounted for 80 percent of total cash receipts. Feed accounted for 74 percent of total variable costs in 1988. Feed expenses as well as labor, repairs, fuel and lube, veterinary and medicine, total fixed cash expenses, and capital replacement were much higher for feeder pig producers than for farrow-to-finish and for feeder pig finishers. Pounds of feed fed changed most for feeder pig producers between 1980 and 1988, declining 72 pounds per cwt of hogs and pigs sold.

Use of family labor in feeder pig production was common because of the special care required for newborn pigs. Expenses for unpaid family labor accounted for 18 percent of total economic costs in 1988. Total economic costs to feeder pig producers were 18 percent higher than total cash costs plus capital replacement. Although cash receipts to feeder pig producers were high enough to yield positive net cash returns during 1988-91, cash receipts were not enough to yield positive residual returns to risk and management in 1988-89.

Table 11--Farrow-to-finish production cash costs and returns, all sizes of operations, North Central region, 1988-91

Item	1988	1989	1990	1991
<i>Dollars per cwt of hogs and pigs sold</i>				
Cash receipts:				
Slaughter hogs (90.02 lbs)	39.22	39.78	49.17	44.13
Feeder pigs (1.38 lbs)	1.17	1.10	1.68	1.49
Cull sows (8.6 lbs)	3.18	3.46	4.57	3.98
Total	43.57	44.34	55.42	49.59
=====				
Cash expenses:				
Feeders--				
Feeder pigs	0.15	0.13	0.22	0.19
Feed--				
Grain	12.66	13.49	13.31	12.90
Protein, byproducts, and other supplements	9.68	9.60	8.06	7.86
Total feed costs	22.34	23.09	21.37	20.76
Other--				
Veterinary and medicine	0.85	0.91	0.95	1.01
Livestock hauling	0.12	0.12	0.12	0.13
Marketing	0.38	0.40	0.41	0.42
Fuel and lube	0.77	0.85	0.95	0.95
Machinery and building repairs	1.37	1.43	1.51	1.49
Hired labor (0.35 hrs)	1.78	1.91	1.97	2.10
Manure handling	0.01	0.01	0.01	0.01
Miscellaneous	0.16	0.16	0.16	0.18
Total, variable cash expenses	27.93	29.01	27.68	27.24
General farm overhead	2.12	2.21	2.27	2.30
Taxes and insurance	0.72	0.71	0.71	0.71
Interest	2.20	2.10	2.04	2.02
Total, fixed cash expenses	5.04	5.02	5.02	5.04
Total, cash expenses	32.97	34.03	32.70	32.27
Cash receipts less cash expenses	10.60	10.31	22.71	17.32
Capital expenditures	3.56	3.69	3.95	4.05
Total, cash expenses and capital expenses	36.53	37.72	36.65	36.32
Net cash returns	7.04	6.62	18.77	13.27
=====				
Economic (full ownership) costs:				
Variable cash expenses	27.93	29.01	27.68	27.24
General farm overhead	2.12	2.21	2.27	2.30
Taxes and insurance	0.72	0.71	0.71	0.71
Capital expenditures	3.56	3.69	3.95	4.05
Operating capital	0.48	0.58	0.52	0.37
Other nonland capital	1.06	1.18	1.32	1.47
Land	0.06	0.07	0.08	0.08
Unpaid labor (0.76 hrs)	3.92	4.06	4.17	4.36
Total, economic costs	39.85	41.51	40.70	40.58
Residual returns to management and risk	3.72	2.83	14.72	9.01

Source: Hog version, 1988 FCRS data.

Table 12--Farrow-to-finish production cash costs and returns, all sizes of operations, Southeast, 1988-91

Item	1988	1989	1990	1991
<i>Dollars per cwt of hogs and pigs sold</i>				
Cash receipts:				
Slaughter hogs (91.97 lbs)	39.21	39.89	49.27	44.16
Feeder pigs (1.43 lbs)	1.15	1.07	1.69	1.65
Cull sows (6.60 lbs)	2.24	2.39	3.25	2.78
Total	42.60	43.35	54.21	48.59
=====				
Cash expenses:				
Feeders--				
Feeder pigs	0.29	0.24	0.43	0.37
Feed--				
Grain	15.04	16.12	15.83	15.40
Protein, byproducts, and other supplements	11.00	11.03	9.26	8.96
Total feed costs	26.04	27.15	25.09	24.36
Other--				
Veterinary and medicine	0.76	0.81	0.85	0.96
Livestock hauling	0.16	0.17	0.17	0.17
Marketing	0.38	0.40	0.41	0.42
Fuel and lube	0.88	0.95	1.08	1.03
Machinery and building repairs	1.24	1.28	1.38	1.30
Hired labor (0.48 hrs)	2.27	2.39	2.47	2.79
Manure handling	0.01	0.01	0.01	0.00
Miscellaneous	0.22	0.24	0.23	0.24
Total, variable cash expenses	32.25	33.65	32.11	31.64
General farm overhead	2.70	2.80	2.92	2.81
Taxes and insurance	0.42	0.41	0.42	0.40
Interest	1.81	1.73	1.75	1.67
Total, fixed cash expenses	4.93	4.94	5.08	4.88
Total, cash expenses	37.18	38.58	37.20	36.53
Cash receipts less cash expenses	5.42	4.77	17.01	12.06
Capital expenditures	3.94	4.05	4.33	4.47
Total, cash expenses and capital expenses	41.12	42.64	41.52	41.00
Net cash returns	1.48	0.72	12.68	7.59
=====				
Economic (full ownership) costs:				
Variable cash expenses	32.25	33.65	32.11	31.64
General farm overhead	2.70	2.80	2.92	2.81
Taxes and insurance	0.42	0.41	0.42	0.40
Capital expenditures	3.94	4.05	4.33	4.47
Operating capital	0.56	0.68	0.60	0.43
Other nonland capital	1.06	1.18	1.33	1.47
Land	0.11	0.13	0.15	0.14
Unpaid labor (0.72 hrs)	3.42	3.44	3.54	3.48
Total, economic costs	44.46	46.34	45.40	44.85
Residual returns to management and risk	-1.86	-2.98	8.81	3.74

Source: Hog version, 1988 FCRS data.

Table 13--U.S. feeder pig production cash costs and returns, all sizes of operation, 1988-91

Item	1988	1989	1990	1991
<i>Dollars per cwt of hogs and pigs sold</i>				
Cash receipts:				
Slaughter hogs (22.61 lbs)	9.41	9.67	12.10	10.62
Feeder pigs (63.92 lbs)	52.25	48.88	74.60	65.07
Cull sows (13.47 lbs)	4.39	4.74	6.19	5.33
Total	66.05	63.28	92.89	81.03
=====				
Cash expenses:				
Feeders--				
Feeder pigs	0.00	0.00	0.00	0.00
Feed--				
Grain	15.11	15.89	15.82	15.05
Protein, byproducts, and other supplements	15.33	15.31	12.73	12.45
Total feed costs	30.44	31.20	28.54	27.50
Other--				
Veterinary and medicine	2.19	2.40	2.49	2.57
Livestock hauling	0.22	0.22	0.25	0.26
Marketing	0.38	0.40	0.41	0.42
Fuel and lube	1.15	1.26	1.45	1.43
Machinery and building repairs	2.79	2.84	3.10	2.93
Hired labor (0.68 hrs)	3.48	3.79	3.79	4.31
Manure handling	0.18	0.21	0.21	0.21
Miscellaneous	0.15	0.16	0.16	0.18
Total, variable cash expenses	40.98	42.47	40.42	39.80
General farm overhead	4.55	4.81	4.96	4.93
Taxes and insurance	1.11	1.10	1.16	1.13
Interest	4.81	4.81	4.76	4.57
Total, fixed cash expenses	10.47	10.72	10.88	10.63
Total, cash expenses	51.45	53.19	51.30	50.43
Cash receipts less cash expenses	14.60	10.09	41.59	30.60
Capital expenditures	6.51	6.69	6.99	6.85
Total, cash expenses and capital expenses	57.96	59.88	58.28	57.28
Net cash returns	8.09	3.40	34.60	23.74
=====				
Economic (full ownership) costs:				
Variable cash expenses	40.98	42.47	40.42	39.80
General farm overhead	4.55	4.81	4.96	4.93
Taxes and insurance	1.11	1.10	1.16	1.13
Capital expenditures	6.51	6.69	6.99	6.85
Operating capital	0.94	1.14	1.01	0.72
Other nonland capital	2.05	2.29	2.66	2.89
Land	0.20	0.23	0.24	0.29
Unpaid labor (2.41 hrs)	12.31	12.07	12.69	13.39
Total, economic costs	68.42	70.80	70.13	70.00
Residual returns to management and risk	-2.37	-7.52	22.76	11.03

Source: Hog version, 1988 FCRS data.

Residual returns to management and risk did, however, increase from -\$7.52 per cwt in 1988 to \$22.76 per cwt in 1990, mainly due to a 53 percent increase in feeder pig prices.

### **Feeder Pig Finishing**

Residual returns to risk and management to feeder pig finishers were negative in 1988 and 1989 and positive in 1990 and 1991 (table 14). Feeder pig finishers posted negative net cash returns in 1988 and 1989. Higher prices of market hogs in 1990 and 1991 resulted in positive net returns in both years. Feed and feeder pigs accounted for most of the variable cash expenses for feeder pig finishers, but such expenses remained a very consistent 90 to 91 percent of variable cash expenses in all 4 years. Expenses for feeder pigs accounted for 52 percent of total variable cash expenses in 1990. The largest cash expenses were for feed in 1988 and 1989 and for feeder pigs in 1990 and 1991. Feed expenses declined in 1990 and 1991, while feeder pig expenses increased significantly in 1990 and 1991. Pounds of feed fed were almost constant between 1980 and 1988. Feeder pig finishers relied more heavily on family labor than paid labor.

### **Housing and Manure Management**

Housing and manure management are two areas of hog production where much change has taken place during the last decade, and these areas will probably see more change in the future, as environmental restrictions increase. Hogs are still produced in many different types of facilities and under many different conditions.

Hog housing on farrow-to-finish operations varies significantly with size of operation (table 15). Larger operations reported wider use of slotted and wire floors, while smaller operations still used solid floors of either concrete or dirt. Dirt was more common than concrete solid floors in almost all sizes of operations. Dirt was the most common floor reported by feeder pig producers, but concrete floors (51 percent) and partially slotted floors (21 percent) were most commonly reported by feeder pig finishers.

Space per cwt of hogs and pigs sold varied inversely with size of farrow-to-finish operation, ranging from 15 square feet per cwt for 300-head operations to 2 square feet per cwt for 15,000-head

operations.<sup>2</sup> Feeder pig finishers allowed about 6 square feet per cwt. Feeder pig producers were the most liberal with space, providing 8 square feet per cwt in the farrowing house, 3 square feet in the nursery, 6 square feet in feeding-finishing houses, and 12 square feet in multipurpose housing.

Manure management has always been a problem for hog producers. Increasingly restrictive environmental regulations aimed at reduction of air, soil, and water pollution have come with increased size of hog operation, reduced diversification, and more concentrated hog operations. On traditional hog operations, many pasture-based producers simply alternated the location of housing and feeding areas, and manure was hauled and spread on cropland as a partial substitute for commercial fertilizers. Location, climate, farm type, and production facilities play an increasingly important role in hog waste management. Lagoons were more common in the Southeast, with over three-fourths of farms reporting lagoons, and about 10 percent more feeder pig producers reported lagoons than feeder pig finishers (table 16). Lagoons were reported two to five times as often on the largest farrow-to-finish hog operations as on the smallest.

Along with the increasing presence of lagoons on larger farrow-to-finish hog operations was an increase in handling manure in liquid rather than in solid form. Smaller operations reported handling solid manure two to three times as often as did larger operations. However, manure was more often spread in liquid form in the Southeast, where winter temperatures are more conducive to handling liquids.

### **Conclusions**

Hog producers' returns improved in 1990-91 over 1988-89 returns. Residual returns to management and risk were positive throughout 1988-91. Residual returns to management and risk were negative for smaller operations. Higher hog prices in 1990 and 1991 accompanied by lower costs, either through increases in production efficiency, like more pigs per litter, or through other cost-reducing technologies, accounted for most of the gain. However, the very largest firms do not appear to be much more

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<sup>2</sup>Some area averages appear small, but more than one hog occupies space in a facility during each year, making the average for each hog less.

Table 14--U.S. feeder pig finishing production cash and economic costs and returns, all sizes of operations, 1988-91

Item	1988	1989	1990	1991
<i>Dollars per cwt of hogs and pigs sold</i>				
Cash receipts:				
Slaughter hogs (98.68 lbs)	43.39	44.03	54.42	49.03
Cull sows (1.31 lbs)	0.66	0.71	0.88	0.79
Total	44.05	44.74	55.30	49.81
=====				
Cash expenses:				
Feeders--				
Feeder pigs	15.72	14.73	22.49	19.55
Feed--				
Grain	10.44	11.10	11.01	10.69
Protein, byproducts, and other supplements	7.13	7.11	5.96	5.85
Total feed costs	17.57	18.21	16.96	16.53
Other--				
Veterinary and medicine	0.64	0.69	0.72	0.76
Livestock hauling	0.12	0.12	0.13	0.13
Marketing	0.38	0.40	0.41	0.42
Fuel and lube	0.61	0.66	0.76	0.73
Machinery and building repairs	1.18	1.18	1.25	1.18
Hired labor (0.11 hrs)	0.54	0.57	0.59	0.62
Manure handling	0.02	0.02	0.02	0.02
Miscellaneous	0.18	0.19	0.20	0.20
Total, variable cash expenses	36.96	36.78	43.54	40.15
General farm overhead	1.61	1.65	1.69	1.64
Taxes and insurance	0.71	0.68	0.69	0.67
Interest	3.45	3.23	3.12	2.99
Total, fixed cash expenses	5.77	5.56	5.50	5.30
Total, cash expenses	42.73	42.34	49.04	45.45
Cash receipts less cash expenses	1.32	2.40	6.27	4.36
Capital expenditures	3.15	3.10	3.13	3.08
Total, cash expenses and capital expenses	45.88	45.44	52.16	48.52
Net cash returns	-1.83	-0.70	3.14	1.29
=====				
Economic (full ownership) costs:				
Variable cash expenses	36.96	36.78	43.54	40.15
General farm overhead	1.61	1.65	1.69	1.64
Taxes and insurance	0.71	0.68	0.69	0.67
Capital expenditures	3.15	3.10	3.13	3.08
Operating capital	0.42	0.50	0.54	0.37
Other nonland capital	0.86	0.95	1.08	1.17
Land	0.02	0.02	0.03	0.03
Unpaid labor (0.43 hrs)	2.20	2.25	2.27	2.35
Total, economic costs	46.15	45.93	52.96	49.47
Residual returns to management and risk	-2.10	-1.19	2.35	0.35

Source: Hog version, 1988 FCRS data.

Table 15--Popularity of selected types of flooring in hog operations, 1988

Type, size, or region	Solid		Wood	Slotted with pit		Wire with scraper
	Concrete	Dirt		Partially	Fully	
<i>Percent of farms reporting</i>						
Farrow-to-finish:						
300 head	24	34	19	3	0	0
650 head	25	24	24	7	4	5
1,000 head	12	22	10	12	8	13
3,000 head	11	16	7	10	14	15
10,000 head	10	13	4	5	18	15
15,000 head	5	5	3	8	20	25
United States	14	19	11	8	11	12
North Central	11	23	9	6	13	11
Southeast	22	11	11	12	6	15
Feeder pig production	12	21	9	15	12	12
Feeder pig finishing	51	10	2	21	8	0

Source: Hog version, 1988 FCRS data.

Table 16--Lagoons and manure handling characteristics, 1988

Type, size, or region	Lagoons	Manure handling		Manure spreader			Manure spread <sup>1</sup>
		Solid	Liquid	Solid	Liquid with injector	Liquid without injector <sup>1</sup>	
-----Percent of farms reporting-----							Percent
Farrow-to-finish:							
300 head	15	78	26	64	3	4	76
650 head	34	67	55	63	17	17	72
1,000 head	37	64	82	56	27	31	85
3,000 head	56	49	83	43	30	26	71
10,000 head	68	42	92	38	31	44	75
15,000 head	76	24	95	22	37	22	61
United States	47	56	74	49	25	26	75
North Central	34	72	79	66	34	31	90
Southeast	77	19	64	9	5	15	43
Feeder pig production	47	46	68	39	8	14	55
Feeder pig finishing	37	48	60	38	19	16	74

<sup>1</sup>These categories may include some liquid manure applied through sprinkler systems.  
Source: Hog version, 1988 FCRS data.

profitable per cwt of hogs sold than the smallest firms. Still, \$2 per hog for 15,000 hogs generates a greater farm income than \$2 per hog for 150 hogs, so the effect of increased volume of sales on overall farm income appears to be at least part of the justification for increasing the size of operations.

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### Appendix 1--Hog Costs of Production: Methodology, Procedures, and Definitions

The Economic Research Service (ERS) develops cost-of-production data in the form of enterprise budgets that summarize all operator and landlord

costs and returns associated with three categories of hog production. Production costs are presented on the basis of a hundredweight (cwt) of hogs and pigs sold, including market hogs, feeder pigs, and all other hogs. Although categories are consistent across budgets prepared for all commodities by ERS, estimation procedures sometimes differ according to data collected on the FCRS.

Cost and return data are separated into three categories: cash receipts, cash expenses, and economic (full ownership) costs.

- 1) Cash receipts include the value of market hogs, feeder pigs, cull sows, and breeding herd sold.
- 2) Cash expenses consist of variable, fixed, and capital replacement expenses. Variable expenses include feeder pigs purchased, feed, veterinary and medicine, livestock hauling, marketing, custom feed mixing, fuels, machinery and building repairs, hired labor, and miscellaneous. Miscellaneous expenses include expenses for bedding and litter, fence maintenance and repairs, and rented/leased machinery and livestock.  
  
Fixed cash expenses include general farm overhead (utilities, office equipment, and vehicle registration), taxes and insurance, and interest paid on farm real estate and non-real estate debt.
- 3) Economic costs are long-term costs that account for all production inputs, regardless of ownership or equity positions of farm operators.

Economic costs include variable cash expenses, fixed cash expenses (excluding total interest expenses), capital replacement, and opportunity costs. The three opportunity costs associated with owned inputs during the production process are the imputed costs of capital invested in other nonland capital, including breeding hogs and replacement gilts, annual machinery and equipment ownership costs, and an imputed cost of land. These expenses are not priced in the market place, so they must be imputed.



Actual capital expenditures were available in the 1988 hog version of the Farm Costs and Returns Survey and provided an alternate means of capturing each year's expenditures for capital replacement. The resulting estimates are higher than capital replacement estimates based on the 1980 survey. The higher estimates in this report reflect some higher values for breeding livestock than depreciation or depreciation-like methods used at the aggregate level and possibly reflect tax and income management strategies that may cause expenditures to vary from year to year. Evidence of this possibility is the fact that the 1980's was a period in which depreciation exceeded actual capital expenditures, by a large margin in some years (Agricultural Outlook, May 1991, pp. 24-5).

Some estimation procedures are changed for the 1988 hogs and pigs estimates. Whole farm expenses for inputs not specifically associated with the production of hogs, such as fuels, machinery and building repairs, capital replacement, taxes and insurance, and interest, are allocated to the hog enterprise. Appendix figure 1 highlights some of the changes made from the 1980 database to the 1988 database. For more detail, look at Economic Indicators of the Farm Sector, Costs of Production--Livestock and Dairy, 1990.

## **Budget Terms and Definitions**

The hog budgets use categories and terms with specific meanings. Those categories and terms are defined in this section.

### Type of Hog Operation

Hog operations are divided into three groups: farrow-to-finish, feeder pig production, and feeder pig finishing enterprises. Farrow-to-finish operators were those who purchased less than 25 percent of their feeder pigs and fed 75 percent of the pigs they farrowed. Feeder pig producers sold 75 percent or more of the pigs they farrowed. Feeder pig finishers purchased more than 25 percent of the feeder pigs they fed. Operations are mixed to some degree. Some farrow-to-finish operators purchase feeder pigs in order to use resources more efficiently. For the same reason, some feeder pig producers sold market hogs in addition to feeder pigs.

### Cash receipts

Cash receipts are based on the value of primary and secondary products produced per unit of production. For all types of hog operations, the unit of production is a hundredweight (cwt) of primary and secondary products sold. Primary products for farrow-to-finish and feeder pig finishing operations are slaughter hogs, while the primary product for feeder pig production operations are feeder pigs. Secondary products for farrow-to-finish and feeder pig production operations are cull sows, cull hogs, and sales of breeding animals, such as open and bred gilts, sows, and boars.

Between hog surveys, primary and secondary product quantities produced per cwt remain unchanged. Prices received for primary and secondary products and quantities reported sold on the 1988 FCRS are multiplied in order to estimate cash receipts. For nonsurvey year updates, the base year cash receipts for primary and secondary products are adjusted by changes in the prices of barrows and gilts (seven markets), sows (seven markets), and feeder pigs (No. 1 and 2, Southern Missouri, 40-45 lbs per head). Cash receipts for market hogs are updated by changes in the seven markets price of barrows and gilts. Feeder pig cash receipts are updated by changes in the prices of No. 1 and 2, Southern Missouri. Cull hogs are updated by changes in the seven markets prices of sows.

Prices received for breeding animals (open and bred gilts, sows, and boars) are reported per head in the 1988 FCRS. In order to estimate the quantities of the breeding herd per unit of production, ERS converts the number of breeding herd sold by multiplying by assumed weights. Open gilts, bred gilts, sows, and boars are assumed to weigh 260, 280, 480, and 330 pounds per head, respectively.

### Variable costs

Variable costs include feeder pig expenses, feed expenses, veterinary expenses, hired labor expenses, and other cash costs incurred because the operation is actively producing hogs. Unlike fixed cash costs that would be incurred with or without hogs being produced, these variable cash costs would not be incurred if the hog operation were idle.

**Feeder Pig Expenses.** Feeder pigs are the primary products of feeder pig production and are inputs for feeder pig finishing. Prices paid for feeder pigs, average weights, and number of feeder pigs

Appendix figure 1--Estimation procedure differences in hog production cost and return estimates

1980 hog survey	1988 hog survey
Cash expenses	Cash expenses
Feed costs:	Feed costs:
Purchased grains and protein supplements--	Purchased grains and protein supplements--
quantities fed multiplied by market price or average cost	Quantities fed multiplied by market price
Fuel, lube, and electricity:	Fuel, lube, and electricity:
ERS budget generator	Hog share of total farm fuel and lube expenditures during the 1988 calendar year
 Machinery and building repairs:	 Machinery and building repairs:
ERS budget generator	Hog share of total building, machinery, and equipment repair expenditures during the 1988 calendar year
 Paid labor:	 Paid labor:
Includes expenses for contract labor, cash wages, cash and noncash expenses paid to family members and others	Excludes operator paid labor
 Taxes and insurance:	 Taxes and insurance:
ERS budget generator	Hog share of total farm real estate and property taxes and crop insurance expenses during the 1988 calendar year
 Capital replacement:	 Capital replacement:
ERS budget generator	Capital expenditures for hog breeding herd, plus hog share of total farm expenditures for buildings, machinery, and equipment
 Economic (full ownership) costs	 Economic (full ownership) costs
Return to nonland capital:	Return to nonland capital:
ERS budget generator	Value of hog breeding herd plus hog share of capital invested in machinery and equipment in 1988 multiplied by the calculated 10-year average real rate of return to agricultural assets

purchased are reported in the 1988 FCRS. The quantities of feeder pigs required per unit of production are estimated and used as inputs for feeder pig finishing operations. Between hog surveys, feeder pig prices are indexed by change in the feeder pig prices as reported by ERS Livestock and Poultry: Situation and Outlook.

**Feed Expenses.** Feed includes grains (corn, barley, sorghum, wheat, oats, and other grains) and protein, byproducts, and other supplements (commercial supplement, feed mill/complete ration, soybean meal with commercial premix, soybean meal with other added, and other supplements). Both homegrown and purchased grains and protein supplements are priced at market prices. For the base year, quantities of each type of grain fed to hogs are multiplied by State average prices (NASS) to estimate costs. Quantities of fed protein supplement are summarized from the 1988 FCRS and multiplied by their relative regional prices to estimate the protein expenses. Prices paid for hog concentrates, 38-42 percent protein, are used to estimate the expenses for the commercial supplement, and prices paid for corn and soybean meal are used to estimate the expenses for the feed mill/complete ration. Prices paid for soybean meal, 44 percent protein, are used to estimate the other protein supplements expenses (soybean meal with commercial premix, soybean meal with other added, and other supplements). Nonsurvey year updates are based on changes from the base year in corn and hog concentrate prices. Corn prices are used as a proxy for prices of other grains.

**Veterinary and Medicine.** Veterinary and medicine expenses are based on the operator-reported hog share of whole-farm veterinary expenses (FCRS). These expenses are updated in nonsurvey years by 20 percent of the change in the prices paid index for fuels and energy plus 30 percent of the change in prices paid index for autos and trucks plus 50 percent of the change in the wage rate index (NASS, Agricultural Prices).

**Livestock Hauling Expenses.** Livestock hauling expenses are based on the hog share of operator reported expenses for hauling items to the operation, to market, or between farms (FCRS). Nonsurvey year updates are indexed by 30 percent of the change in the prices paid index for fuels and energy plus 70 percent of the change in the prices paid index for farm and motor supplies (NASS, Agricultural Prices).

**Marketing Expenses.** The FCRS yielded insufficient information to estimate marketing expenses in 1988. So, marketing expenses are 1980-based dollar amounts indexed by the prices paid index for all production items of nonfarm origin (NASS, Agricultural Prices).

**Fuel, Lube, and Electricity Expenses.** Fuel, lube, and electricity expenses are based on the fuel cash expenses for the operation reported on the FCRS. These fuel, lube, and electricity expenses were allocated to the hog enterprise based on an enterprise share, which was derived from costs imputed in the 1988 Firm Enterprise Data System (FEDS) for fuel, lube, and electricity for all crops.<sup>3</sup> Nonsurvey year updates are indexed by the change in the prices paid index for fuels and energy (NASS, Agricultural Prices).

**Machinery and Building Repairs.** Machinery and building repairs are based on cash repair expenses for the farm reported on the FCRS. Total repair costs for the operation were allocated to the hog enterprise according to the hog share of FEDS-based repairs. Nonsurvey year updates are indexed by 50 percent of the change in the prices paid index for farm and motor supplies plus 50 percent of the change in the prices paid index for farm services and cash rent (NASS, Agricultural Prices).

**Hired Labor Expenses.** Hired labor expenses include payments to contract labor, cash wages, other cash, and the market value of noncash benefits paid to workers and paid management labor reported in the FCRS. Labor expenses paid to the operator are excluded from this line item but are included in the unpaid labor item of economic costs. Total labor expenses were allocated to hog enterprises according to the percentage of paid labor time spent on hog operations (FCRS). Nonsurvey year updates are indexed by changes in regional weighted average wage rates plus employer's share of Social Security taxes (NASS, Farm Labor).

#### Fixed cash costs

Fixed cash costs are those cash costs that would be incurred whether or not a single hog was produced. Fixed cash costs include factors that are difficult to allocate to a single enterprise, such as overhead, taxes, insurance, and interest expenses.

<sup>3</sup>See the Economic Indicators of the Farm Sector, Costs of production--Livestock and Dairy, 1990 for a full description of this FEDS-based allocation.

**General Farm Overhead.** General farm overhead (GFO) includes items required for general business operation, including expenses for electricity (except irrigation electricity), telephone, water (except irrigation water), farm share of motor vehicle, liability and blanket insurance policies, registration and license fees for motor vehicles, general business expenses, office equipment purchases, farm supplies and hand tools, accessories for motor vehicles and machinery, farm shop power equipment, damages paid for loss or injury connected with the operation but not covered by insurance, fence repairs and maintenance, and expenses for farm improvements, including land, drainage, irrigation, and facilities to improve productivity. These whole farm expenses are allocated to the hog enterprise based on the hog share of total farm receipts. For each observation, hog share of total receipts is multiplied by whole farm general farm overhead expenditures to obtain a GFO cost for that observation. Nonsurvey year updates are indexed by index of prices paid for all production items (NASS, [Agricultural Prices](#)).

**Taxes and Insurance.** Taxes and insurance costs are based on expenses reported in the FCRS for all real estate and property taxes, Federal Crop Insurance Corporation (FCIC), and all other crop and livestock insurance. Total tax and insurance costs for the whole farm are allocated to the hog enterprise according to the hog share of FEDS-based repair costs. Nonsurvey year updates are indexed by 65 percent of the change in the prices paid index for taxes plus 35 percent of the change in FCRS livestock farm insurance per farm expense (NASS, [Agricultural Prices](#)).

**Interest.** Interest costs include interest and service fees on farm land, buildings, other real estate debt, and operating loans reported for whole farm operation (FCRS). Since interest is paid on the total farm operation, a percentage is allocated to the hog enterprise based on the hog share of total farm receipts. Nonsurvey year changes are indexed by the prices paid index for interest (NASS, [Agricultural Prices](#)).

#### Capital expenditures

Capital expenditures are 1988 expenditures to replace breeding stock, machinery, equipment, and buildings. Capital expenditures for hog operations were estimated by multiplying capital expenditures for each asset type as reported in FCRS for buildings (actual FCRS expenditure multiplied by FEDS-based hog share of repair costs), machinery

and equipment (actual FCRS expenditure multiplied by FEDS-based hog share of repair costs), and replacement livestock (actual FCRS expenditure for hog replacement breeding stock) (see text box on page 20). Nonsurvey year updates are indexed by changes in the value of total farm assets ([Agricultural Outlook](#)).

#### Opportunity costs

Opportunity costs are dollar amounts assets could have earned but are considered to be foregone because the assets were used in hog production. Opportunity costs are noncash costs representing a longrun view. These costs will have to be covered in the long run in order to retain the assets in hog production.

**Economic Cost of Operating Capital.** Economic cost of operating capital is an average opportunity cost of capital used to purchased variable production inputs used in hog production. The expected returns to this type of investment is assumed to equal the return from a savings account or similar financial investment. The 6-month Treasury bill rate is multiplied by total variable cash expenses multiplied by the 90-day period money is assumed to be borrowed for hog operation.

#### **Economic Cost of Other Nonland Capital.**

Economic cost of other nonland capital is an opportunity cost of capital invested in machinery, equipment, and buildings used in the hog enterprise, plus the value of the breeding herd (sows, boars, and replacement gilts) for a given year. The economic cost of nonland capital is estimated by multiplying the longrun real rate of return to production assets in the farm sector by (1) the hog share of investment in trucks and autos, tractors, machinery, tools, equipment and implements owned, (2) the hog share of all farm buildings, plus (3) the estimated market value (December 31, 1988) of sows, boars, and all other hogs and pigs on the farm (FCRS). In nonsurvey year updates are indexed by changes in the value of farm assets as reported by ERS [Agricultural Outlook](#) and changes in the longrun real rate of returns to production assets in the farm sector as reported by ERS in [Economic Indicators of the Farm Sector: National Financial Summary](#).

**Economic Cost of Land.** Economic cost of land is based on pasture acreage and nonpasture hog lots used in the hog operation (FCRS). Capital invested in land is estimated by multiplying acreage by State average land value per acre ([Agricultural Resources: Agricultural Land Values](#)). Expected returns to land

are estimated by multiplying the estimated capital value of land used in the hog operation times longrun real rate of return to agricultural assets (Economic Indicators of the Farm Sector: National Financial Summary). Nonsurvey year updates are indexed by changes in State land values as well as changes in the longrun real rate of returns to agricultural assets (Agricultural Resources: Agricultural Land Values and Economic Indicators of the Farm Sector: National Financial Summary, respectively).

**Residual Returns to Management and Risk.**

Residual returns to management and risk are the residual amount above longrun production costs that are covered by average cash receipts in a given year. These returns are the difference between cash receipts and total economic costs and are expected to be positive in the longrun.

## SUMMARY OF REPORT

# 1991 Net Farm Income Third Highest On Record

Number 9, February 1993

Contact: Cheryl Johnson, (202) 219-0804

**N**et farm income in 1991 was \$44.6 billion, the third highest on record, trailing only 1989 and 1990. The decline came about because production expenses were about the same as 1990 while prices and production for most commodities were down.

The decline was split pretty evenly between livestock and crops. Reduced sales of livestock and products reduced net farm income by \$3.2 billion, largely because of a \$2.1-billion decline in sales of dairy products. The decline due to crops came about chiefly because of a drawdown in inventory (that is, more crops were taken out of storage than were put in. Value of inventory is one component that goes into the overall net farm income measure).

To obtain a more complete picture of the status of the farm sector, the recently published ERS report, *Economic Indicators of the Farm Sector: National Financial Summary, 1991*, looks at several measures of farm income and balance sheet accounts:

**Net farm income** dropped 12.5 percent, triggered by a decline in gross farm income while production expenses remained about the same. Net farm income is an approximate measure of the farm's net value of production in the year. It includes all income and expenses, both cash and noncash, associated with the farm business and onfarm dwellings. It also measures the accounting profit from current-year production of

commodities, and the value of services generated by dwellings located on the farm.

**Returns to operators**, which differs from net farm income by excluding all income and expenses related to operator dwellings, declined 12.7 percent to \$43.2 billion.

**Net cash income** was down 5.4 percent to \$58 billion, after setting records in each of the previous 6 years. This drop was due almost entirely to a decline in Government payments and lower receipts from the sale of dairy products. Net cash income measures cash earnings that farmers receive during the year from their farm business.

**Farm equity** dropped 1 percent as the value of farm assets declined, and outstanding debt increased. Farm debt increased for the first time since 1984, up \$2 billion from 1990 to \$139 billion. Real estate debt rose to \$74.4 billion, up \$700 million, and nonreal estate debt increased to \$64 billion, up by over \$1.2 billion.

The **debt-to-asset ratio** rose from 16.2 to 16.5 percent, the second lowest level of farm business debt relative to assets in the past 15 years. This ratio is a good method for assessing overall financial risk by measuring debt pledged against farm business assets.

Net farm income	
Year	Net farm income
Billion dollars	
1970	14.4
1975	25.5
1980	16.1
1985	28.8
1989	49.9
1990	51.0
1991	44.6

### To Order This Report...

The information presented here is excerpted from *Economic Indicators of the Farm Sector: National Financial Summary, 1991*, ECIFS 11-1. The cost is \$9.00. You may subscribe to the annual series of four separate reports at \$17.00.

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